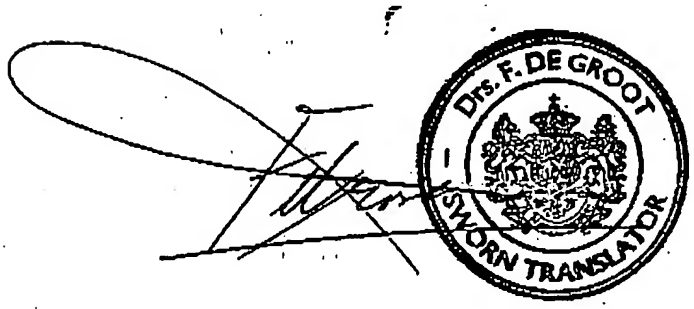
CERTIFICATION

I, drs. F. de Groot, a sworn translator of Dutch nationality,
of J. Boezerstraat 83, 2552 DL DEN HAAG, the Netherlands,
do hereby declare that, to the best of my knowledge and belief, the
attached translation prepared by me is a true and accurate
translation of French patent specification FR 2 754 584 .

Signed this 28th day of November, 2005



CMJ/MBX P53221US00

-translation of French patent application A1 2754584 (96 12781)-

Title: Pressure reducer for fluid distribution installation

The present invention contemplates a pressure reducer for a fluid distribution installation.

In a fluid distribution installation whose input is subject to a variable pressure within a certain range of values, it is desirable to maintain the pressure at a lower and substantially constant value to supply the apparatuses and other water-consuming elements which this installation comprises. Thus, in particular, for domestic water supply, the distribution pressure of the various apparatuses is to be in the order of three bars.

In a known manner, a pressure reducer includes a fluid passage opening whose section is susceptible of being modified by intermediacy of a movable element subject to the action of antagonistic forces constituted by the fluid pressure prevailing downstream of the water reducer on the one hand and by a spring on the other hand. When no water is being drawn, the pressure downstream of the reducer increases, so that the force being exerted on the movable element becomes higher than the force exerted by the spring, which results in the closure of the fluid passage opening. Conversely, when water is being drawn, the pressure downstream of the reducer falls, and with the force of the spring prevailing over that of the pressure, the sliding element releases the passage opening.

The known pressure reducers possess considerable dimensions, and need to be interposed between two lengths of pipe to which they are to be connected by the intermediacy of connections. The active device of the reducer is mostly perpendicular to the axis of the pipe, and the opening whose section is to be modified is also perpendicular to the pipe, which creates a modification in the direction of flow of the fluid at the reducer.

The object of the invention is to provide a pressure reducer, in particular for a fluid distribution installation for domestic and industrial

use, whose dimensions are very much reduced, allowing it to be integrated, if need be, in a pipe, with a simple structure, of excellent performance and great reliability.

To this end, the reducer to which the invention relates, comprises:

- a cylindrical tubular body intended to be mounted inside a pipe, or between two lengths of pipe coaxially therewith,

- a valve, centered on the axis of the body, arranged at the upstream end thereof, and connected to the body by a plurality of radial legs,

- a tubular piston having an axial passage, and comprising two successive cylindrical portions: a downstream portion of greater diameter intended for guiding the piston in the body, and an upstream portion of smaller diameter, guided in a part of the body of reduced internal diameter, and intended to form a seat for the valve, a spring being interposed between the downstream portion of the piston and the upstream part of the body, the piston being axially movable between a position in which it is supported against the valve and closes the fluid passage, and a position in which it is moved downstream and opens the fluid passage.

The tubular piston finds itself subject to the antagonistic actions of the spring which tends to push it towards a position of opening the fluid passage opening, and of the pressure of the fluid downstream, which is exerted on its posterior face. When the pressure downstream increases, in the absence of water being drawn, the force exerted on the posterior face of the piston becomes higher than that exerted by the spring, and the piston slides upstream, ending up supported against the valve so as to close the fluid passage. Conversely, during a period of water being drawn, the pressure downstream of the pressure reducer falls, and the spring force prevails over the force applied by this pressure, so that the tubular piston slides in downstream direction, thereby releasing the fluid passage and allowing the passage of fluid from the upstream side towards the downstream side of the reducer.

According to one feature of the invention, the zone of the valve against which the upstream end of the piston, forming a seat, is intended to become supported, in closed position, is equipped with a packing.

Further, the piston comprises, in its external surface, an intermediate portion between the upstream and downstream portions, delimiting with the internal wall of the body a housing for the spring.

Advantageously, the upstream and intermediate portions of the piston are connected by an annular shoulder perpendicular to the axis of the piston, while the corresponding parts of the body are connected by an annular shoulder perpendicular to the axis of the body, these two shoulders being arranged to be supported against each other and to form a stop system in the closed position of the fluid passage.

When the pressure reducer is in closed position, the two shoulders are supported against each other, forming a mechanical stop avoiding premature wear of the valve and of the end of the piston forming a seat, which are in sealing contact, without sustaining mechanical loads.

Further, the annular shoulder of the body has, towards the external wall of the body, an annular cavity directed upstream, serving as a housing for an end of the spring. This cavity makes it possible to ensure an excellent guidance of the spring.

According to another feature, the internal wall of the body comprises, near its downstream end, an annular groove serving to mount an open ring forming a stop for the tubular piston upon downstream displacement thereof.

To ensure sealing assembly of the piston with respect to the body, the downstream portion of the piston comprises an annular groove serving to mount a packing intended to ensure the sealing with respect to the body, while the upstream part of the body delimiting the fluid passage comprises an annular groove serving to mount a packing intended to ensure the sealing with respect to the upstream portion of the piston.

Advantageously, the external diameter of the body is equal to the internal diameter of a pipe in which the reducer is intended to be placed, the body comprising in its external surface at least one annular groove, in which is accommodated a packing intended to realize the sealing with respect to the pipe.

Further, when the reducer is intended to be placed in a pipe, its body comprises an outwardly directed annular flange, placed between the facing ends of two lengths of pipe. This flange can be covered with a flexible element, such as an elastomer, which ensures the sealing between the two lengths of pipe considered.

In any event, the invention will be readily understood with the description that follows, with reference to the accompanying diagrammatic drawing representing, by way of non-limiting example, an embodiment of this pressure reducer, wherein:

Figure 1 is a view in the closed position of the fluid passage, that is, in the absence of fluid being drawn.

Figure 2 is a view during the opening of the passage.

The fluid pressure reducer represented in the drawing is intended in particular for a domestic or industrial water supply installation.

Represented in the drawing are two lengths of pipe 2 and 3, whose ends are equipped with annular radial flanges 4 and 5. The pressure reducer comprises a tubular cylindrical body 6, of an external diameter corresponding to the internal diameter of the length of pipe 3, in which the reducer is intended to be placed. In its external wall, the body 6 comprises a groove 7 intended to receive a packing 8 ensuring the sealing between the body and the length of pipe 3. The body 6 also comprises, near its upstream end, in the direction of flow of the fluid, a peripheral flange 9 extending radially outwards, intended to be arranged between flanges 4 and 5 of the lengths of pipeline 2 and 3. This flange 9 ensures the axial blocking of the pressure reducer, and can also ensure the sealing between the lengths of

pipe, to the extent where it is covered with a supple element, such as an elastomer having sealing properties.

The tubular body 6 is equipped, near its upstream end, with a shaped head 10 forming a valve, which is connected to the body by a plurality of radial legs 12. The valve is shaped to have an oblong form, of rotational symmetry, and is centered on axis 13 of body 6 and pipe 3. On the side of its upstream end, valve 10 comprises a groove 14 intended to receive a sealing packing 15 retained, for example, by a rivet 16 fitted in a bore of the valve.

The pressure reducer also comprises a tubular piston 17 comprising two successive cylindrical portions, a downstream portion 18 of greater diameter, intended for the guidance of piston 17 in the body, and an upstream portion 19 of lesser diameter, guided in a part 20 of the body whose opening is of reduced diameter, the end of this portion 19 being intended to form a seat 22 for valve 10. The downstream portion 18 of the tubular piston 17 comprises an annular groove 23 intended to accommodate a packing 24 ensuring the sealing between the piston and the internal wall of body 6. The upstream part 20 of the body, in turn, comprises an annular groove 25 serving to accommodate a packing 26 ensuring the sealing between the upstream portion 19 of the piston and part 20 of the body.

The tubular piston 17 is mounted so as to be axially slidable in the body. It is fitted in the body, then retained by the intermediacy of a split ring 27 fitted in a groove 28 recessed in the internal surface of body 6.

As shown in the drawing, the piston comprises in its external surface an intermediate portion 29 between the downstream portion 18 and upstream portion 19, delimiting with the internal wall of the body a housing for a spring 30. The intermediate portion 29 of the piston is connected to the upstream portion 19 by a shoulder 32 of radial orientation. Similarly, part 20 of the body is connected to the part of greater diameter thereof by an annular shoulder perpendicular to axis 13. The annular shoulder 33 comprises, towards the external wall of the body, an annular cavity 35

serving to accommodate an end of spring 30, which allows a good guidance thereof. Spring 30 is thus supported on one side against the body at the end of cavity 35 and on the other side against an opposite surface situated towards the downstream end of the piston.

The tubular piston 17 is subject to the antagonistic action of spring 30 and of the pressure exerted on its downstream surface 36. When there is no fluid-drawing downstream of the reducer, the pressure downstream increases, and the pressure exerted on surface 36 generates a force higher than that of the spring. Piston 17 is moved upstream, until its part 22 forming a seat comes to be supported against packing 15 of valve 10, thus closing the fluid passage.

During fluid-drawing downstream, the downstream pressure falls, so that the force exerted by spring 30 becomes higher than the force resulting from the pressure on surface 36, allowing the opening of a passage between the seat 22 and valve 10. The passing flow is a function of the value of the opening. The hydrodynamic profile of the valve improves the flow. The tubular piston can move downstream until it finds support on the ring 27 forming a stop. The release value of the pressure reducer is a function of the setting of spring 30.

It is also possible to provide in the upstream part of the body a filter intended to collect the sediments.

Because of the external shape of body 6 and the presence of the sealing packing 8, this pressure reducer is intended to be placed directly in a pipe or a housing provided in all types of installation requiring fluid relaxation from a provided pressure to a selected pressure, in order to protect and improve operation of the installation, regardless of the nature of the fluid.

As it goes without saying, the invention is not limited to the sole embodiment of this reducer described above by way of example but encompasses all variants. Thus, in particular, bore 37 of the tubular piston could be of constant cross section, the shape of the valve could be different,

or the dynamic sealing means between the piston and the body could be obtained differently without thereby departing from the framework of the invention.

CLAIMS

1. A pressure reducer for a fluid distribution installation, of the type comprising a fluid passage opening whose section is susceptible of being modified by intermediacy of a movable element subject to the action of antagonistic forces constituted by the fluid pressure prevailing downstream of the reducer on the one hand and by a spring on the other hand, characterized in that it comprises:

- a cylindrical tubular body (6) intended to be mounted inside a pipe (3), or between two lengths of pipe, coaxially therewith,
- a valve (10), centered on the axis of the body, arranged at the upstream end thereof, and connected to the body by a plurality of radial legs (12),
- a tubular piston (17) including an axial passage (37) and comprising two successive cylindrical portions: a downstream portion (18) of greater diameter, intended for guiding the piston in the body, and an upstream portion (19) of lesser diameter, guided in a part (20) of the body of reduced internal diameter, and intended to form a seat (22) for the valve (10), a spring (30) being interposed between the downstream portion (18) of the piston (17) and the upstream part of the body (6), the piston (17) being axially movable between a position in which it is supported against the valve (10) and closes the fluid passage, and a position in which it is moved downstream and opens the fluid passage.

2. A pressure reducer according to claim 1, characterized in that the zone of the valve (10) against which the upstream end of the piston (17), forming a seat (22), is intended to become supported, in closed position, is equipped with a packing (15).

3. A pressure reducer according to any one of claims 1 and 2, characterized in that the piston (17) comprises in its external surface an intermediate portion (29) between the upstream (19) and downstream (18)

portions, delimiting with the inside wall of the body a housing for the spring (30).

4. A pressure reducer according to claim 3, characterized in that the upstream (19) and intermediate (29) portions of the piston are connected by an annular shoulder (32) perpendicular to the axis of the piston, while the corresponding parts of the body (6) are connected by an annular shoulder (33) perpendicular to the axis of the body, these two shoulders (32, 33) being arranged to be supported against each other and to form a stop system in the closed position of the fluid passage.

5. A pressure reducer according to claim 4, characterized in that the annular shoulder (33) of the body (6) has, towards the external wall of the body, an annular cavity (35) directed upstream, serving as a housing for an end of the spring (30).

6. A pressure reducer according to any one of claims 1 to 5, characterized in that the internal wall of the body (6) comprises near its downstream end an annular groove (28) serving to mount an open ring (27) forming a stop for the tubular piston (17) upon downstream displacement thereof.

7. A pressure reducer according to any one of claims 1 to 6, characterized in that the downstream portion of the piston (17) comprises an annular groove (23) serving to mount a packing (24) intended to ensure sealing with respect to the body (16), while the upstream part (20) of the body delimiting the fluid passage comprises an annular groove (25) serving to mount a packing (26) intended to ensure sealing with respect to the upstream portion (19) of the piston.

8. A pressure reducer according to any one of claims 1 to 7, characterized in that the external diameter of the body (6) is equal to the internal diameter of a pipe (3) in which the reducer is intended to be placed, the body (6) comprising in its external surface at least one annular

groove (7), in which is accommodated a packing (8) intended to realize sealing with respect to the pipe.

9. A pressure reducer according to any one of claims 1 to 7, characterized in that when the reducer is intended to be placed in a pipe, its body comprises an outwardly directed annular flange (9), placed between the facing ends (4, 5) of two lengths of pipe (2, 3).

ABSTRACT

The pressure reducer comprises a cylindrical body (6) intended to be mounted inside a pipe (3) or between two lengths of pipe, coaxially therewith, a valve (10), centered on the axis of the body, arranged at the upstream end thereof, and connected to the body by a plurality of radial legs (12), a tubular piston (17) having an axial passage (37) and comprising two successive cylindrical portions: a downstream portion (18) of greater diameter, intended to guide the piston in the body, and an upstream portion (19) of lesser diameter, guided in a part (20) of the body of reduced internal diameter, and intended to form a seat (22) for the valve, a spring (30) being interposed between the downstream portion (18) of piston (17) and the upstream part of the body (6), the piston being axially movable between a position in which it is supported against the valve (10) and closes the fluid passage, and a position in which it is moved upstream and opens the fluid passage.

Application in water distribution installations.

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